



NOAA SCIENTIFIC PUBLICATIONS REPORT

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HIGHLIGHTED ARTICLES

[Vocal performance affects metabolic rate in dolphins: implications for animals communicating in noisy environments](#)

Journal of Experimental Biology (3.002)

[Signals of climate, density-dependence, and human disturbance in Pacific salmon dispersal](#)

Ecology (5.175)

[An integrated assessment model for helping the United States sea scallop \(*P. magellanicus*\) fishery plan ahead for ocean acidification and warming](#)

PLoS One (3.53)

[Integrative monitoring of marine and freshwater harmful algae in Washington State for public health protection](#)

Toxins (2.480)

[Recent California water year precipitation deficits: A 440-year perspective](#)

Journal of Climate (4.904)

ADDITIONAL ARTICLES

NMFS Publications

[Principles for managing marine ecosystems prone to tipping points](#)

Ecosystem Health & Sustainability (*new journal*)

[A framework for examining climate driven changes to the seasonality and geographic range of coastal pathogens](#)

Climate Risk Management (*new journal*)

[To bid or not to bid: the role of participation rates in conservation auction outcomes](#)

American Journal of Agricultural Economics (1.363)

[Environmental conditions impacting juvenile Chinook salmon growth off central California: an ecosystem model analysis](#)

Geophysical Research Letters (4.456)



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[Temperature-dependent growth of *Thysanoessa macrura*: inter-annual and spatial variability](#)

Marine Ecology Progress Series (2.64)

[Changes in growth and maturation parameters of Pacific sardine *Sardinops sagax caeruleus* collected off California during a period of stock recovery from 1994 to 2010](#)

Journal of Fish Biology (1.734)

[Effect of environmental conditions on juvenile recruitment of Alewife and Blueback Herring in freshwater: A coastwide perspective](#)

Canadian Journal of Fisheries and Aquatic Sciences (2.276)

[Chum salmon \(*Oncorhynchus keta*\) growth and temperature indices as indicators for the year-class strength of age-1 walleye pollock \(*Gadus chalcogrammus*\) in the eastern Bering Sea](#)

Fisheries Oceanography (2.542)

[US catch share markets: A review of data availability and impediments to transparent markets](#)

Marine Policy (2.621)

[Improving estimates of in-water marine turtle abundance by adjusting aerial survey counts for perception and availability biases](#)

Journal of Experimental Marine Biology and Ecology (2.475)

[First record of *Mollisquama* sp. \(Chondrichthyes: Squaliformes: Dalatiidae\) from the Gulf of Mexico, with a morphological comparison to the holotype description of *Mollisquama parini* Dolganov](#)

Zootaxa (0.974)

[Novel foraging strategies observed in a growing leopard seal \(*Hydrurga leptonyx*\) population at Livingston Island, Antarctic Peninsula](#)

Animal Biotelemetry (N/A)



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[The validity of nominal species of *Malacocottus* \(Teleostei: Cottiformes: Psychrolutidae\) known from the eastern North Pacific with a key to the species](#)

Copeia (0.901)

[Dynamic ocean management for a dynamic marine environment](#)

Marine Policy (2.621)

[How much evidence is required for acceptance of productivity regime shifts in fish stock assessments: are we letting managers off the hook?](#)

Fisheries Research (1.843)

[Trends in developed cover adjacent to habitat for threatened salmon in Puget Sound, Washington, U.S.A](#)

PLoS ONE (3.534)

[US catch share markets: emerging markets or market failures?](#)

Marine Policy (2.621)

[Development of 12 microsatellite loci in the red tree corals *Primnoa resedaeformis* and *Primnoa*](#)

Conservation Genetics Resources (1.85)

[Molecular insights into geographic and morphological variation within the *Eumicrotremus asperrimus* species complex \(Cottoidei: Cyclopteridae\)](#)

Ichthyological Research (0.962)

[New abbreviated calculation for measuring intrinsic rebound potential in exploited fish populations – example for sharks](#)

Canadian Journal of Fisheries and Aquatic Sciences (2.276)

[The fishery performance indicators: a management tool for the triple bottom line](#)

PLoS ONE (3.53)



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[First eastern North Pacific record of the velvet dogfish, *Zameus squamulosus* \(Chondrichthyes: Squaliformes: Somniosidae\)](#)

Marine Biodiversity Records (NA)

[Habitat use by juvenile salmon sharks links upwelling to strandings in the California Current](#)

Marine Ecology Progress Series (2.64)

[Effect of dietary taurine supplementation on growth, feed efficiency, and nutrient composition of juvenile sablefish \(*Anoplopoma fimbria*\) fed plant based feeds](#)

Aquaculture (2.586)

[And on top of all that. . .Coping with ocean acidification in the midst of many stressors](#)

Oceanography (2.986)

[Genetic population structure of Hogfish \(Labridae: *Lachnolaimus maximus*\) in the southeastern United States](#)

Fishery Bulletin (1.783)

[Quantifying diadromous species in the diets of marine fishes in the Gulf of Maine](#)

Journal of Fish Biology (1.734)

[Records of two manefishes, *Platyberyx andriashevi* and *P. rhyton* \(Teleostei: Perciformes: Caristiidae\), from off the Ogasawara Islands, Japan](#)

Species Diversity (0.989)

[Dynamic ocean management: 21st century approaches for marine resource management and conservation](#)

Bioscience (5.439)

[NWS Publications](#)

[A validation of passive microwave rain rate retrievals from the Chinese Feng Yun \(FY\) 3B Satellite](#)

Journal Hydrometeorology of AMS (2.95)



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NOS Publications

[Longitudinal measures of perfluoroalkyl substances \(PFAS\) in serum of Gullah African Americans in South Carolina: 2003-2013](#)

Environmental Research (3.951)

[Elevated levels of perfluoroalkyl substances in estuarine sediments of Charleston, SC](#)

Science of the Total Environment (3.163)

NESDIS Publications

OAR Publications

[Inline coupling of WRF-HYSPLIT: model development and evaluation using tracer experiments](#)

Journal of Applied Meteorology and Climatology (2.099)

OTHER REPORTS, BOOK CHAPTERS, AND INTERNAL PUBLICATIONS

NMFS

[Wildlife forensics: an overview and update for the prosecutor](#)

United States Attorneys Bulletin

[Book Review of, "A Guide to the Rockfishes, Thornyheads, and Scorpionfishes of the Northeast Pacific"](#)

Transactions of the American Fisheries Society

HIGHLIGHTED ARTICLES

Vocal performance affects metabolic rate in dolphins: Implications for animals communicating in noisy environments

Journal of Experimental Biology (3.002)

M. M. Holt, D. P. Noren (NMFS/NWFSC), R. C. Dunkin, and T. M. Williams

- The study empirically demonstrates for the first time that vocal modifications in a marine mammal can have an energetic impact at the individual level.
- These data provide a mechanistic foundation for evaluating biological consequences of vocal modification in noise-polluted habitats.

Many animals produce louder, longer or more repetitious vocalizations to compensate for increases in environmental noise. Biological costs of increased vocal effort in response to noise, including energetic costs, remain empirically



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undefined in many taxa, particularly in marine mammals that rely on sound for fundamental biological functions. The authors tested the hypothesis that an increase in vocal effort would result in an energetic cost to the signaler by experimentally measuring oxygen consumption during rest and after a two minute vocal period in dolphins that were trained to vary vocal loudness. Vocal effort was quantified as the total acoustic energy of sounds produced. Metabolic rates during the vocal period were, on average, 1.2 and 1.5 times higher than resting metabolic rates in the two tested dolphins. As vocal effort increased, the authors found that there was a significant increase in metabolic rate over resting during the two minute sound production period in both dolphins and total oxygen consumption increased significantly in the dolphin that showed a wider range of vocal effort across trials. Increases in vocal effort, defined as increases in vocal amplitude, repetition rate, and/or duration, are consistent with behavioral responses to noise in free-ranging animals. The authors empirically demonstrate for the first time in a marine mammal that such vocal modifications can have an energetic impact at the individual level. These data provide a mechanistic foundation for evaluating biological consequences of vocal modification in noise-polluted habitats.

Accepted 30 March 2015

Signals of climate, density-dependence, and human disturbance in Pacific salmon dispersal

Ecology (5.175)

P. A. H. Westley, **A. H. Dittman**, **E. J. Ward (NMFS/NWFSC)**, and T. Quinn

- The authors used a 20+ year dataset of 19 populations of Chinook salmon from the Columbia River to examine factors that affect dispersal (straying) rates.
- They found that climate variables, including the Pacific Decadal Oscillation climatic index and local water temperature, and population-specific factors, including migration distance and density-dependence, affect salmon dispersal probability of from these 19 populations
- Taken together these results challenge the pervasive assumption that dispersal rates are homogenous within species, temporally static, and insensitive to climatic forcing.

Dispersal is the foundational process underpinning adaptive climate-induced range shifts, yet is widely assumed to be insensitive to climatic or human



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disturbances. Using a 17-year database representing 159,719 Chinook salmon marked as juveniles from 19 hatchery populations in the Columbia River, USA, and recovered as adults throughout the basin, we show that 86.3% of the interannual deviance in dispersal rate can be explained by abiotic, biotic, and human variables. We detected a net negative influence of i) the Pacific Decadal Oscillation climatic index, ii) density-dependence, iii) variation in the magnitude of streamflow during outmigration and return years, and iv) hatchery practices that potentially disrupt the imprinting process as juveniles. In contrast, we detected a net positive influence of increasing water temperature on dispersal (stray) rates. We found significant responses by other factors in subsets of populations, despite no net effects. Taken together these results challenge the pervasive assumption that dispersal rates are homogenous within species, temporally static, and insensitive to climatic forcing.

Accepted 24 March 2015

*An integrated assessment model for helping the United States sea scallop (*P. magellanicus*) fishery plan ahead for ocean acidification and warming*
PLoS One (3.53)

S. R. Cooley, J. E. Rheuban, **D. R. Hart**, V. Luu, D. M. Glover, **J. A. Hare**, S. C. Doney (NMFS/NEFSC)

- The authors developed a coupled biogeochemical, stock assessment, and economic model for sea scallops.
- Ocean acidification may negatively impact yields from the sea scallop fishery, based on experimental effects studies on the King Scallop.
- Experimental work is needed on Atlantic Sea Scallop to understand the effects of ocean acidification.

Ocean acidification, the progressive change in ocean chemistry caused by uptake of atmospheric CO₂, is likely to affect some marine resources negatively, including shellfish. The Atlantic sea scallop (*Placopecten magellanicus*) supports one of the most economically important single-species commercial fisheries in the United States. Careful management appears to be the most powerful short-term factor affecting scallop populations, but in the coming decades scallops will be increasingly influenced by global environmental changes such as ocean warming and ocean acidification. In this paper, we describe an integrated assessment



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model (IAM) that numerically simulates oceanographic, population dynamic, and socioeconomic relationships for the U.S. commercial sea scallop fishery. Our primary goal is to enrich resource management deliberations by offering both short- and long-term insight into the system and generating detailed policy-relevant information about the relative effects of ocean acidification, temperature rise, fishing pressure, and socioeconomic factors on the fishery using a simplified model system. Starting with relationships and data used now for sea scallop fishery management, the model adds socioeconomic decision making based on static economic theory and includes ocean biogeochemical change resulting from CO₂ emissions. The model skillfully reproduces scallop population dynamics, market dynamics, and seawater carbonate chemistry since 2000. It indicates sea scallop harvests could decline substantially by 2050 under RCP 8.5 CO₂ emissions and current harvest rules, assuming that ocean acidification affects *P. magellanicus* by decreasing recruitment and slowing growth, and that ocean warming increases growth. Future work will explore different economic and management scenarios and test how potential impacts of ocean acidification on other scallop biological parameters may influence the social-ecological system. Future empirical work on the effect of ocean acidification on sea scallops is also needed. Expected Publication: 30 April 2015

Integrative monitoring of marine and freshwater harmful algae in Washington State for public health protection

Toxins (2.480)

V. L. Trainer, J. Hardy (NMFS/NWFSC)

- Provides an integrated assessment of all HAB risks in Washington State, and details the increased risk of HAB occurrences potentially due to climate factors
- Describes how citizen monitoring efforts have been integrated with HAB early warning systems in Washington State
- These monitoring efforts are an effective interface between the general public and state and federal authorities, and aid in the detection and forecasting of HAB occurrences

The more frequent occurrence of both marine and freshwater toxic algal blooms and recent problems with new toxic events have increased the risk for illness



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and negatively impacted sustainable public access to safe shellfish and recreational waters in Washington State. Marine toxins that affect safe shellfish harvest in the state are the saxitoxins that cause paralytic shellfish poisoning (PSP), domoic acid that causes amnesic shellfish poisoning (ASP) and the first ever US closure in 2011 due to diarrhetic shellfish toxins that cause diarrhetic shellfish poisoning (DSP). Likewise, the freshwater toxins microcystins, anatoxin-a, cylindrospermopsins, and saxitoxins have been measured in state lakes, although cylindrospermopsins have not yet been measured above state regulatory guidance levels. This increased incidence of harmful algal blooms (HABs) has necessitated the partnering of state regulatory programs with citizen and user-fee sponsored monitoring efforts such as SoundToxins, the Olympic Region Harmful Algal Bloom (ORHAB) partnership and the state's freshwater harmful algal bloom passive surveillance program that allow citizens to share their observations with scientists. Through such integrated programs that provide an effective interface between formalized state and federal programs and observations by the general public, county staff and trained citizen volunteers, the best possible early warning systems can be instituted for surveillance of known HABs, as well as for the reporting and diagnosis of unusual events that may impact the future health of oceans, lakes, wildlife, and humans.

Accepted: 26 March 2015

Link to full article: <http://www.mdpi.com/2072-6651/7/4/1206/htm>

Recent California Water Year Precipitation Deficits: A 440-year Perspective
Journal of Climate (4.904)

H. Diaz (NOAA-ESRL/CIRES), E. Wahl (NOAA/NCEI)

- Precipitation deficits currently occurring in CANV are similar in intensity to others that have occurred during the past half-millennium, and thus do not appear to be attributable to human-caused climate change per se.
- However, when this kind of dryness is coupled with anthropogenic temperature increases in the region, unprecedented drought as a combination of dryness and warmth is currently occurring.

An analysis of the October 2013–September 2014 precipitation in the western United States and in particular over the California-Nevada region suggests this anomalously dry season, while extreme, is not unprecedented in comparison with the ~120-year long instrumental record of water year (WY, October–



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September) totals, and in comparison with a 407-year WY precipitation reconstruction back to 1571. Over this longer period nine other years are known or estimated to have been nearly as dry or drier than the current year. The three-year deficit for WY's 2012-2014, which in the California region exceeded the annual mean precipitation, is more extreme but also not unprecedented, occurring three other times over the past ~ 440 years in the reconstruction. WY precipitation has also been deficient on average for the past 14 years, and such a run of predominantly dry WY's is also a rare occurrence in our merged reconstructed plus instrumental period record.

Expected publication date: April 30 2015

link to publication: <http://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-14-00774.1>

ADDITIONAL ARTICLES

NMFS Publications

Principles for managing marine ecosystems prone to tipping points

Ecosystem Health and Sustainability

K. A. Selkoe, P. S. Levin, J. F. Samhouri (NMFS/NWFSC)

As climatic changes and human uses intensify, resource managers and other decision-makers are taking actions to either avoid or respond to ecosystem tipping points -- dramatic shifts in structure and function that are often costly and hard to reverse. Evidence indicates that explicitly addressing tipping points leads to improved management outcomes. Drawing on theory and examples from marine systems, we distill a set of seven principles to guide effective management in ecosystems with tipping points, derived from the best available science. These principles are based on observations that tipping points: (1) are possible everywhere; (2) are associated with intense and/or multi-faceted human use; (3) may be preceded by changes in early warning indicators; (4) may redistribute benefits among stakeholders; (5) affect the relative costs of action and inaction; (6) suggest biologically-informed management targets; and (7) often require an adaptive response to monitoring. We suggest that early action to preserve system resilience is likely more practical, affordable and effective than late action to halt or reverse a tipping point. We articulate a conceptual approach to management focused on linking management targets to thresholds, tracking early warning signals of ecosystem instability and stepping up investment in monitoring and mitigation as the likelihood of dramatic ecosystem change increases. This approach can simplify and economize



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management by allowing decision makers to capitalize on the increasing value of precise information about threshold relationships the closer a system is to tipping, or by ensuring that restoration effort is sufficient to tip a system into the desired regime.

Accepted 23 March 2015

A framework for examining climate driven changes to the seasonality and geographic range of coastal pathogens

Climate Risk Management

J. Jacobs, **S. K. Moore (NMFS/NWFSC)**, K. Kunkel, L. Sun

- Two approaches for evaluating climate change impacts on coastal pathogens are demonstrated.
- First shows expansion of the seasonal windows of growth for *Vibrio* and *Alexandrium*.
- Second identifies the potential for geographic range expansion for *Vibrio*.

Climate change is expected to alter coastal ecosystems in ways which may have predictable consequences for the seasonality and geographical distribution of human pathogens and harmful algae. Here we demonstrate relatively simple approaches for evaluating the risk of occurrence of pathogenic bacteria in the genus *Vibrio* and outbreaks of toxin-producing harmful algae in the genus *Alexandrium*, with estimates of uncertainty, in U.S. coastal waters under future climate change scenarios through the end of the 21st century. One approach forces empirical models of growth, abundance and the probability of occurrence of the pathogens and algae at specific locations in the Chesapeake Bay and Puget Sound with ensembles of statistically downscaled climate model projections to produce first order assessments of changes in seasonality. In all of the case studies examined, the seasonal window of occurrence for *Vibrio* and *Alexandrium* broadened, indicating longer annual periods of time when there is increased risk for outbreaks. A second approach uses climate model projections coupled with GIS to identify the potential for geographic range shifts for *Vibrio* spp. in the coastal waters of Alaska. These two approaches could be applied to other coastal pathogens that have climate sensitive drivers to investigate potential changes to the risk of outbreaks in both time (seasonality) and space (geographical distribution) under future climate change scenarios.

Accepted March 18, 2015



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To bid or not to bid: the role of participation rates in conservation auction outcomes

American Journal of Agricultural Economics (1.363)

G. DePiper (NMFS, NEFSC)

- Participants in conservation auctions, like fishing license buyback, have a large impact on whether management goals can be achieved.
- Participation costs and informational heterogeneity are important considerations in understanding who is likely to participate, and should be considered when designing conservation auctions.

In order to better understand the link between the decision to participate in conservation auctions with actual conservation outcomes, the author jointly analyzed the stated willingness of eligible participants to accept values associated with fishing license buybacks in the Chesapeake Bay blue crab fishery with the actual revealed value of auction bids. In contrast with theoretical expectations, the author found that individuals with the lowest willingness to accept fishing license buyback values participated in these reverse auctions at lower rates than other eligible individuals, all else being equal. This suggests that whoever bids in an auction plays an important role in the success of conservation outcomes. Therefore, market design should expand to consider how and if the economic incentives underlying auction participation align with desired conservation outcomes, both within fisheries and in natural resource management more broadly.

Accepted March 21, 2015

Environmental conditions impacting juvenile Chinook salmon growth off central California: an ecosystem model analysis

Geophysical Research Letters (4.456)

J. Fiechter, **D. D. Huff (UCSC & NMFS/SWFSC)**, B. T. Martin, **D. W.**

Jackson (UCSC & NMFS/SWFSC), C. A. Edwards, K. A. Rose, E. N.

Curchitser, K. S. Hedstrom, **S. T. Lindley (NMFS/SWFSC)**, and **B. K. Wells (NMFS/SWFSC)**

- This paper uses a fully coupled ecosystem model to identify the effects of environmental conditions and upwelling on growth of juvenile Chinook salmon in central California coastal waters.



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- Using a mechanistic rather than statistical approach, the results of the model simulation provide insight into the linkages between ocean climate variation and salmon recruitment.

A fully coupled ecosystem model is used to identify the effects of environmental conditions and upwelling variability on growth of juvenile Chinook salmon in central California coastal waters. The ecosystem model framework is comprised of an ocean circulation submodel, a biogeochemical submodel, and an individual-based submodel for salmon. Simulation results indicate that years favorable for juvenile salmon growth off central California are characterized by particularly intense early season upwelling (i.e., March through May), leading to enhanced krill concentrations during summer near the location of ocean entry (i.e., Gulf of the Farallones). Seasonally averaged growth rates in the model are generally consistent with observed values, and suggest that juvenile salmon emigrating later in the season (i.e., late May and June) achieve higher weight gains during their first 90 days of ocean residence.

Accepted March 26, 2015

*Temperature-dependent growth of *Thysanoessa macrura*: inter-annual and spatial variability*

Marine Ecology Progress Series (2.64)

R. M. Driscoll, **C. S. Reiss (NMFS/SWFSC)**, and B. T. Hentschel

- The authors used data collected from four bi-annual surveys to estimate growth rates of one the most abundant pelagic invertebrates in the Southern Ocean, *Thysanoessa macrura*.
- Growth rates were strongly correlated with temperature, suggesting that the growth rates of *T. macrura* may increase in regions exhibiting warming trends, such as the Antarctic Peninsula.
- This is the first paper to examine growth in *T. macrura*, which is a potential competitor in Antarctic food chain

Somatic growth of pelagic invertebrates is controlled by temperature and food, both of which vary in space and time. Because growth rate responses to environmental variability are species-specific and may affect populations through changes in reproductive potential, measuring spatial and temporal variability in growth rates of highly abundant zooplankton is critical to predict the impact of climate change on pelagic



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ecosystems. Here, we used length frequencies from bi-annual surveys conducted one month apart to estimate growth rates of one the most abundant euphausiids in the Southern Ocean, *Thysanoessa macrura*. We analyzed summer data from four separate years (1995, 1998, 2001, and 2004) that varied widely in temperature and primary production. To assess inter-annual and spatial variability in cohort growth, stations within the surveys were grouped by water characteristics into either warm fresh Antarctic Circumpolar Current (ACC) water or cold saline Bransfield Strait and Weddell Sea (MBW) water. Mid-summer cohort growth rates of *T. macrura* varied between years and water masses, ranging from -0.037 mm day⁻¹ in MBW water in 2004 to 0.081 mm day⁻¹ in ACC water in 1995. Growth rates were faster in ACC water than in MBW water during all years. Growth rates were strongly correlated with temperature ($R^2 = 0.82$), but weakly correlated with copepod density ($R^2 = 0.38$), and were not correlated with chlorophyll-a concentration ($R^2 = 0.11$). These results suggest that the growth rates of *T. macrura* may increase in regions exhibiting warming trends, such as the Antarctic Peninsula. This contrasts with published data on the growth rates of *Euphausia superba*, which is predicted to be impacted negatively by climate warming.

Expected Publication Date: July 1, 2015

Changes in growth and maturation parameters of Pacific sardine Sardinops sagax caeruleus collected off California during a period of stock recovery from 1994 to 2010

Journal of Fish Biology (1.734)

E. Dorval (NMFS/SWFSC), J. D. McDaniel (NMFS/SWFSC), B. J. Macewicz (NMFS/SWFSC) and D. L. Porzio

- This study showed that with proper modeling, density-dependent growth rate can be detected and taken into account in sardine stock assessment models.
- Growth rate of sardine cohorts collected in the spawning core area off California was density-dependent during the 1994-2010 period.
- The removal of large fish from the Pacific Northwest fishery had probably contributed to the high levels of growth rate and cohort diversity observed in recent years.



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- The mixed-effects models developed in this paper demonstrate how growth curves can be developed from multiple age-readers and cohorts (among other factors), and thus will have broad applications in developing age-structured models for stock assessment and estimating population growth rates in fishery ecology.

Pacific sardine (*Sardinops sagax caeruleus*) biomass along the North American coast fluctuated between less than 0.6 and 1.5 million mt during 1986-2010, exhibiting a rise and then a fall over three decades of fisheries management. We investigated whether this fluctuation in density influenced the growth and maturation parameters of three aggregated cohorts collected off California from 2004 to 2010, including fish born during the 1986-1993, 1996-2003, and 2004-2008 periods. Using a von Bertalanffy mixed-effects model with aggregated cohorts as covariates, estimated growth rate significantly co-varied with aggregated cohorts. Growth rate (K) was modeled as a fixed effect and estimated to be 0.264 (S.E. = 0.015). Statistical contrasts among aggregated cohorts showed that the 1996-2003 cohorts had a significantly lower growth rate than the other two aggregated cohorts. The theoretical age at length zero (t_0) and the length at infinity (L_{∞}) were modeled as random effects, and were estimated to be -2.885 (S.E. = 0.259) and 273.13mm (S.E. = 6.533), respectively. The relation of ovary-free mass-at-length was significantly different among the three aggregated cohorts, with the allometric coefficient estimated to be 2.85 (S.E. = 0.013) for the *S. sagax* population. The age-at-length trajectory of *S. sagax* born between 1986 and 2008 showed strong density dependence effects on somatic growth rates. In contrast to the density dependent nature of growth, the probability to be mature at-size or at-age was not significantly affected by aggregated cohort density. The size and the age at 50% maturity were estimated to be 150.92 mm and 0.56 years, respectively. Stock migration, natural fluctuations in biomass, and removal of older and larger *S. sagax* by fishing might have been interplaying factors controlling growth parameters during 1986-2010.

Accepted March 20, 2015



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Chum salmon (Oncorhynchus keta) growth and temperature indices as indicators for the year-class strength of age-1 walleye pollock (Gadus chalcogrammus) in the eastern Bering Sea

Fisheries Oceanography (2.542)

E. Yasumiishi (NMFS/AKFSC), K. R. Criddle, N. Hillgruber, F. J. Mueter, and J. H. Helle

- New indicators and predictors for pollock recruitment are presented.
- This work contributed to the [North Pacific Fishery Management Council's Ecosystem Considerations](#) report which is compiled as part of the Stock Assessment and Fishery Evaluation report process.

Ecosystem-based fisheries management requires the development of physical and biological time series that index ocean productivity for stock assessment and recruitment forecasts for commercially important species. Since recruitment in marine fish is related to ocean condition, we developed proxies for ocean conditions based on sea surface temperature and biometric measurements of chum salmon (*Oncorhynchus keta*) captured in the walleye pollock (*Gadus chalcogrammus*) fishery in the eastern Bering Sea in three periods (July 16-30, September 1-15, and September 16-30). The main purpose of this paper was to evaluate Pacific salmon (*Oncorhynchus* spp.) growth as a possible indicator of ocean conditions that, in turn, may affect age-1 walleye pollock recruitment. Marine growth rates of Pacific salmon are the result of a complex interplay of physical, biological, and population-based factors that fish experience as they range through oceanic habitats. These growth rates can therefore be viewed as indicators of recent ocean productivity. Thus, our hypothesis is that estimated intra-annual growth in body weight of immature and maturing age-4 male and female chum salmon may be used as a biological indicator of variations in rearing conditions also experienced by age-0 walleye pollock; consequently, they may be used to predict the recruitment to age-1 in walleye pollock. Summer SSTs and chum salmon growth at the end of July and September explained the largest amount of variability in walleye pollock recruitment indicating that physical and biological indices of ocean productivity can index fish recruitment.

Accepted March 27, 2015

Effect of environmental conditions on juvenile recruitment of Alewife and Blueback Herring in Freshwater: A coastwide perspective



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Canadian Journal of Fisheries and Aquatic Sciences (2.276)

D. Tommasi (OAR/GFDL), J. Nye, C. Stock (OAR/GFSL), J. Hare (NMFS/NEFSC), M. Alexander (OAR/ESRL), and K. Drew (ASMFC)

- River herring recruitment linked to large-scale environmental factors
- River herring recruitment linked to density-dependent processes
- Study supports the development of climate projects for the freshwater phase of river herring life cycle

The abundance of alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*) has declined throughout their range, and there are increasing concerns about their conservation status. Because of their diadromous life history, variability in rates of survival in freshwater can affect overall recruitment. The objective of our study was to assess how river temperature and flow influence young of the year (YOY) river herring recruitment in the Northeast US. Observations of adult and juvenile fish in five rivers were used to construct spawner-YOY recruits models; these rivers were chosen because of the length of the time series (>15 years) and the paired observations of spawners and juveniles. An environmentally-explicit stock recruitment model explained a substantial fraction (41 to 80%) of the variance in YOY abundance, depending on river system. Our approach allowed for a preliminary discussion of potential mechanisms, which need to be further substantiated by focused field and laboratory studies. Early summer river flow and river temperature had the greatest influence indicating the importance of conditions in nursery habitats. In certain systems, spring or fall conditions were also important determinants of survival suggesting additional effects of the environment on spawning of adults and juvenile egress from freshwater nursery habitats.

Expected Publication date: March 25, 2015

Available Online: http://www.nrcresearchpress.com/doi/abs/10.1139/cjfas-2014-0259?src=recsys#.VRKtFe7F_JA

US Catch Share Markets: A Review of Data Availability and Impediments to Transparent Markets

Marine Policy (2.621)

D. Holland (NMFS/NWFSC), E. Thunberg (NMFS/OST), J. Agar , S. Crosson (NMFS/SEFSC), C. Demarest (NMFS/NEFSC), S. Kasperski



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**(NMFS/AKFSC), L. Perruso (NMFS/SEFSC), E. Steiner
(NMFS/NWFSC), J. Stephen , A. Strelcheck , and M. Travis
(NMFS/SERO)**

- A growing number of US fisheries are managed with catch share programs, and the market for catch share privileges play an important role in ensuring these management systems are efficient and achieve the economic and biological goals they were designed to achieve and can provide valuable information to fishery managers and stakeholders.
- This study found that price information on catch share transfers is limited or unavailable in most US catch share programs.
- The authors make a number of recommendations that can improve the availability and utility of information from catch share markets and may also increase their efficiency.

A growing number of US fisheries are managed with catch share programs, which allocate exclusive shares of the total allowable catch from a fish stock to individuals, cooperatives, communities, or other entities. All of these catch share programs allow transferability of catch privileges in some form. Information on these transfers, particularly prices, could be valuable to fishery managers and to fishery participants to support management and business decisions and to increase efficiency of the catch share market itself. This paper documents the availability and quality of data on transfers of catch privileges in fourteen US catch share programs. These catch share programs include several individual fishing quota (IFQ) programs and a number of programs that allocate catch privileges to self-organized cooperatives. This study finds that price information on catch share transfers is limited or unavailable in most US catch share programs. The authors make recommendations on how to improve the design of catch share programs and associated data collection systems to facilitate effective catch share markets, collection of catch share market data, and better use of information from catch share markets.

Accepted March 22, 2015

Improving estimates of in-water marine turtle abundance by adjusting aerial survey counts for perception and availability biases.

Journal of Experimental Marine Biology and Ecology (2.475)

B. I. Fuentes MMPB, R. Hagihara, M. Hamann, J. Hazel, A. Huth, **J.A. Seminoff** (NMFS/SWFSC), S. Sobtzyck, H. Marsh



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- This study examined the impacts of observer bias on aerial survey efforts and found that adjusting for availability bias increased the abundance estimates 18.7 times; adjusting for perception bias resulted in a further 5% increase.
- The results emphasize the need to consider availability and perception corrections to obtain robust abundance estimates. This approach has application for aerial surveys for other marine wildlife including marine mammals and large sharks

Aerial surveys are often used to provide estimates of wildlife abundance. The probability of detecting an animal during a survey involves two processes: (1) perception bias, when some animals potentially visible to observers are missed; and (2) availability bias when animals present in the search area are not available for detection. Estimating these two sources of bias can lead to improved abundance estimates. However to date no marine turtle aerial survey has considered both biases. To improve in-water marine turtle abundance estimates from aerial counts we estimated: (1) perception bias using independent tandem observers and mark recapture models, and (2) availability bias by quantifying the effect of environmental conditions on the detection probability of turtles. We compared unadjusted and adjusted abundance estimates to evaluate the effects of these detection biases in aerial surveys. Adjusted data produced a substantially higher estimate of turtles than the unadjusted data. Adjusting for availability bias increased the estimates 18.7 times; adjusting for perception bias resulted in a further 5% increase. These results emphasize the need to consider availability and perception corrections to obtain robust abundance estimates. This approach has application for aerial surveys for other marine wildlife including marine mammals and large sharks.

Accepted March 17, 2015

First record of Mollisquama sp. (Chondrichthyes: Squaliformes: Dalatiidae) from the Gulf of Mexico, with a morphological comparison to the holotype description of Mollisquama parini Dolganov
Zootaxa (1.060)

M. A. Grace (NMFS/SEFSC), M H. Doosey, H.L. Bart, G. J. P. Naylor (NOS/NCOSS)



NOAA SCIENTIFIC PUBLICATIONS REPORT

APRIL 13, 2015

- Second specimen of a pocket shark ever collected.
- A considerable range extension is established since the first specimen was from the southeast Pacific, and the second specimen was collected from the U.S. Gulf of Mexico.
- First phylogenetic analysis for the genus, and places *Mollisquama* in family Dalatiidae.

The description of the pocket shark genus *Mollisquama* (based on *M. parini* Dolganov, 1984) is based on a single known specimen collected from the Nazca Ridge of the southeast Pacific Ocean. A second *Mollisquama* specimen has been captured in the central Gulf of Mexico establishing a considerable range extension. Both specimens possess the remarkable pocket gland with its large slit-like external opening located just above the pectoral fin. Features found on the Gulf of Mexico specimen that were not noted in the description of *M. parini* include a series of ventral abdominal photophore agglomerations and a modified dermal denticle surrounded by a radiating arrangement of denticles just posterior to the mouth. Based on a comparisons of the Gulf of Mexico specimen with information in the description of *M. parini*, the Gulf of Mexico specimen is identified as *Mollisquama* sp. due to differences in tooth morphology and vertebral counts. Phylogenetic analysis of NADH2 gene sequences places *Mollisquama* sister to *Dalatis* plus *Isistius* within the family Dalatiidae.

Accepted: 3 March 2015

Novel foraging strategies observed in a growing leopard seal (Hydrurga leptonyx) population at Livingston Island, Antarctic Peninsula
Animal Biotelemetry (N/A)

D. J. Krause (NMFS/SWFSC), M. E. Goebel (NMFS/SWFSC), G. J. Marshall, and K. Abernathy

- This paper provides the first observations of animal-borne HD footage of leopard seals in Antarctica, including hunting and social encounters
- Furthers understanding of the basic ecology for an important apex predator in the Southern Ocean

Leopard seals are apex predators that can alter the community structure of Antarctic coastal ecosystems, but previous behavioral studies were limited to land-based, daytime observations. Researchers present the first analysis of animal-borne HD video footage from seven deployments obtained in January and February of 2013 and 2014 from adult female leopard seals on Livingston



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Island, Antarctica. The average deployment length was 4.80 ± 2.45 (range: 0.86 - 9.12) days, which covered a total of 16 foraging trips with a mean dive depth of 14.84 ± 8.98 m. Habitat use, along with prey capture attempts and social encounters, were scored from 50.3 hours of video data. Leopard seal foraging focused on four prey items: Antarctic fur seals, Antarctic fur seal pups, pygoscelid penguins, and demersal notothen fishes. Leopard seals have been described as generalist apex predators; however, video and movement data suggest that leopard seals employ specialized prey-specific hunting tactics. Although preliminary, the findings indicate that leopard seals can affect coastal ecosystems through pathways beyond direct predation, including stealing prey and food caching.

Accepted: 26 March 2015

The validity of nominal species of Malacocottus (Teleostei: Cottiformes: Psychrolutidae) known from the eastern North Pacific with a key to the species Copeia (0.901)

D. E. Stevenson (NMFS/AKFSC)

- This study confirms the distribution of two eastern North Pacific species of *Malacocottus*
- Recognizes the whitetail sculpin (*M. aleuticus*) as a synonym of *M. zonurus*

Eastern North Pacific species of the fathead sculpin genus *Malacocottus* Bean are assessed following examination of over 300 specimens collected from throughout the known range of the genus, extending from the west coast of North America around the Pacific Rim to Japan. The results of this study demonstrate that two species of *Malacocottus* occur in the eastern North Pacific. *Malacocottus zonurus* is found in the North Pacific from Washington State around the Pacific Rim to Japan, and in all marginal seas. *Malacocottus kincaidi* Gilbert and Thompson is apparently endemic to the Salish Sea, known only from Puget Sound and the Strait of Georgia. These two species differ in preopercular spine morphology and gill-raker counts. *Malacocottus aleuticus* Smith, based on a single juvenile specimen, is a synonym of *M. zonurus*. This study includes redescriptions of *M. zonurus* and *M. kincaidi*, comparisons of both species with *M. gibber*, and a key to the three known species of the genus.

Accepted: 3 September 2014

Available online: <http://www.asihcopeiaonline.org/doi/abs/10.1643/CI-14-074>



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APRIL 13, 2015

Dynamic ocean management for a dynamic marine environment

Marine Policy (2.621)

S. M. Maxwell, **E. L. Hazen (NMFS/SWFSC)**, R. L. Lewison, D. C. Dunn, H. Bailey, **S. J. Bograd (NMFS/SWFSC)**, D. K. Briscoe, **S. Fossette (NMFS/SWFSC)**, A. J. Hobday, M. Bennett, **S. Benson (NMFS/SWFSC)**, M. R. Caldwell, D. P. Costa, **H. Dewar (NMFS/SWFSC)**, **T. Eguchi (NMFS/SWFSC)**, L. Hazen, **S. Kohin (NMFS/SWFSC)**, **T. Sippel (NMFS/SWFSC)**, and L.B. Crowder

- Mobile management that moves with marine features is more efficient than traditional static approaches.
- A dynamic approach can be automated to model risk or even economics with user feedback when key triggers are met.
- Dynamic management also provides an opportunity for ecosystem based management (beyond fisheries).

Marine and terrestrial systems differ significantly in the spatial and temporal scales. However, most marine management comes from terrestrial techniques, such as drawing stationary boundaries (e.g., marine protected areas) around mobile marine features, animals, or resource users. While these approaches can work for stationary marine resources, to be most effective marine management must be as fluid as the managed resources. This study suggests a shift towards dynamic ocean management, or management that rapidly changes in space and time in response to changes in the ocean and its users. This dynamic ocean management can be done through integration of near real-time biological, oceanographic, social and/or economic data. Dynamic management can better balance ecological and economic objectives with advances in data collection and sharing, such as remote sensing, animal tracking, and mobile technology. Existing examples demonstrate that dynamic management can successfully allow managers to respond rapidly to changes on-the-water. However, to implement dynamic ocean management widely, several gaps must be filled. These include enhancing compliance, enforcement and legal instruments, incorporating ecological and socioeconomic considerations simultaneously, and developing applications across additional marine resource sectors.

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Expected Publication : 15 April 2015



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Trends in developed cover adjacent to habitat for threatened salmon in Puget Sound, Washington, U.S.A

PLoS ONE (3.534)

K. K. Bartz, M. J. Ford, T. J. Beechie, K. L. Fresh, G. R. Pess, M. Rowse, M. B. Sheer (NMFS/NWFSC), and Robert Kennedy

- Developed land cover has increased in Puget Sound salmon habitat areas from 1986-2008.
- These increases are very small and tend to be in areas that are already developed.
- There is evidence that the rate of development in some habitat types has slowed, perhaps due to ESA listings or the WA Growth Management Act.

For widely distributed species at risk, such as Pacific salmon (*Oncorhynchus* spp.), habitat monitoring is both essential and challenging. Only recently have widespread monitoring programs been implemented for salmon habitat in the Pacific Northwest. Remote sensing data, such as satellite imagery, are therefore a useful way to evaluate trends prior to the advent of species-specific habitat monitoring programs. We used annual land cover maps created from Landsat images from 1986-2008 to evaluate trends in developed land cover in areas adjacent to five types of habitat utilized by Chinook salmon (*O. tshawytscha*) in the Puget Sound region of Washington State. For the region as a whole, we found significant increases in developed land cover adjacent to each of the habitat types evaluated (nearshore, estuary, mainstem channel, tributary channel, and floodplain), but these increases were small (<1% total increase from 1986 to 2008). The specific trajectory of trends changed during the time series for each habitat type. In nearshore, mainstem, and floodplain areas, the rate of increase in developed land cover slowed in the latter portion of the time series, while the opposite occurred in estuary and tributary areas. Watersheds that were already highly developed in 1986 tended to have higher rates of development than initially less developed watersheds. Overall, our results suggest that developed land cover in areas adjacent to Puget Sound salmon habitat has increased only slightly since 1986 and that the rate of change has slowed near some key habitat types, although this has occurred within the context of a degraded baseline condition.

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US catch share markets: emerging markets or market failures?

Marine Policy (2.621)

D. S. Holland (NMFS/NWFSC), E. Thunberg (NMFS/OST), J. Agar (NMFS/SEFSC), S. Crosson (NMFS/SEFSC), C. Demarest (NMFS/NEFSC), S. Kasperski (NMFS/AFSC), L. Perruso (NMFS/SEFSC), E. Steiner (NMFS/NWFSC), J. Stephen (NMFS/SEFSC), A. Strelcheck (NMFS/SEFSC), M. Travis (NMFS/SERO)

- Documents the availability and quality of data on transfers of catch privileges in US catch share programs and found that price information on share transfers is limited or unavailable in most US catch share systems.
- Data collection programs on catch share markets in US are generally insufficient.

A growing number of US fisheries are managed with catch share systems, which allocate exclusive shares of the total allowable catch from a fish stock to individuals, cooperatives, communities, or other entities. All of these programs allow transferability of catch privileges in some form. Information on share transfers, particularly prices, could be valuable to fishery managers and to fishery participants and other stakeholders and is important for development of efficient catch share markets. The authors document the availability and quality of data on transfers of catch privileges in fourteen US catch share programs, including several individual fishing quota (IFQ) programs and a number of programs that allocate catch privileges to self-organized cooperatives. Price information on catch share transfers is limited or unavailable in most US catch share systems, and the authors make recommendations on how to improve the design of catch share systems and associated data collection systems to facilitate effective catch share markets, collection of catch share market data, and better use of information from catch share markets.

Accepted: 24 March 2015

*Development of 12 microsatellite loci in the red tree corals *Primnoa resedaeformis* and *Primnoa pacifica**

Conservation Genetics Resources (1.85)

C. L. Morrison, M. J. Springmann, K. Shroades, and R. P. Stone (NMFS/AKFSC)



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- Developed genetic loci used to determine regional patterns of population connectivity for one of the most important corals in the North Pacific Ocean.

The authors developed a suite of tetra-, penta-, and hexa-nucleotide microsatellite loci from Roche 454 pyrosequencing data for the cold-water octocorals *Primnoa resedaeformis* and *P. pacifica*. Twelve of 98 primer sets tested consistently amplified in 30 *P. resedaeformis* samples from Baltimore Canyon (western North Atlantic Ocean) and in 24 *P. pacifica* samples (Shutter Ridge, eastern Gulf of Alaska). The loci displayed moderate levels of allelic diversity (average 7.5 alleles /locus) and heterozygosity (average 47%). Levels of genetic diversity were sufficient to produce unique multi-locus genotypes and to distinguish species. These common species are long-lived (hundreds of years) and provide essential fish habitat (*P. pacifica*), yet populations are provided little protection from human activities. These loci will be used to determine regional patterns of population connectivity to inform effective marine spatial planning and ecosystem-based fisheries management.

Accepted: 16 February 2015

Available online: <http://link.springer.com/article/10.1007%2Fs12686-015-0455-1>

Molecular insights into geographic and morphological variation within the Eumicrotremus asperrimus species complex (Cottoidei: Cyclopteridae)
Ichthyological Research (0.962)

Y. Kai, **D. E. Stevenson (NMFS/AKFSC)**, Y. Ikeda, T. Hamatsu, and T. Nakabo

- Confirms presence of two distinct clades in the *Eumicrotremus asperrimus* species complex.
- Calls into question the practice of diagnosing species based solely on tubercle morphology.
- Establishes the need for a complete taxonomic revision of the genus *Eumicrotremus*.

The authors present a molecular phylogeny of lumpsuckers, *Eumicrotremus asperrimus* and related species (family Cyclopteridae), based on the basis of sequence variations in the cytochrome b and cytochrome c oxidase subunit 1 genes (1,659 base pairs) of mitochondrial DNA using specimens collected from across the North Pacific, including



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the Sea of Japan, Sea of Okhotsk, Bering Sea, and Gulf of Alaska. Specimens identified as *Eumicrotremus phrynoides*, *Cyclopteropsis bergi*, *Cyclopteropsis lindbergi*, and *Lethotremus muticus* based on the presence or absence of spiny tubercles and height of the first dorsal fin did not exhibit reciprocal monophyly, but were randomly clustered with *E. asperrimus*. This collection of forms is therefore referred to as the “*E. asperrimus* species complex.” DNA sequence data presented here divided the *E. asperrimus* species complex into two distinct clades, corresponding to the eastern North Pacific (the Bering Sea, Aleutian Islands, and Gulf of Alaska) and the western North Pacific (the Seas of Japan and Okhotsk) regions. Slight morphometric differences between eastern and western clades were also evident, suggesting these represent at least two different species. Genetic divergence between the two clades suggests that the speciation event occurred during the early Pleistocene to late Pliocene (~2.5 MYA). Although the presence and morphology of tubercles have been used extensively for species discrimination in Cyclopteridae, our results suggest that this character complex is confounded by intraspecific variation. These results underscore the need for a thorough re-examination of the taxonomy of Pacific cyclopterids using molecular data to supplement potentially misleading tubercle morphology.

Accepted: 11 December 2014

Available online: <http://link.springer.com/article/10.1007%2Fs10228-014-0453-4#page-1>

New abbreviated calculation for measuring intrinsic rebound potential in exploited fish populations – example for sharks

Canadian Journal of Fisheries and Aquatic Sciences (2.276)

D. W. Au, S. E. Smith, and C. Show (NMFS/SWFSC)

- Age at maturity is the one parameter absolutely indispensable for life history studies, particularly of data-poor species.
- Rebound potential analysis relates to species resiliency and can be used to evaluate stock status of low productivity stocks.
- This analysis requires increased research for determining the ages at maturity of all exploited species, i.e., age and growth studies.

Intrinsic rebound potential, the demographic measure of a fish population's productivity that sustains a given mortality, relates to species



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resiliency and can be useful for understanding and evaluating the status of exploited populations, especially those poorly monitored and of low productivity, like many shark populations. The rebound potential is derived from the Euler–Lotka equation and, with the dynamics kept simple, is easily calculated for a given total mortality, needing only a species' age at maturity and its natural mortality (M). Its value can be quickly read from an isopleth diagram, where contour pattern show the interdependence of these two key parameters among different life histories. How the rebound potentials change as a function of age at maturity and the full range of possible M values also shows a way to estimate a species' natural mortality bounds. Improved age and growth information, specifically age at maturity, is critical for estimating this parameter, and demographic research should be encouraged.

Accepted: January 2015

*Effect of dietary taurine supplementation on growth, feed efficiency, and nutrient composition of juvenile sablefish (*Anoplopoma fimbria*) fed plant based feeds*

Aquaculture (2.586)

R. B. Johnson, S. Kim, A. M. Watson, F. T. Barrows, E. L. Kroeger, **P. M. Nicklason**, **G. W. Goetz** (NMFS/NWFSC), A. R. Place

- Dietary taurine requirements were determined for optimum growth and feed efficiency of sablefish, a high value marine species of emerging interest to the aquaculture industry.
- Tissue taurine saturation is reported for whole body and muscle tissue of sablefish receiving taurine supplemented feeds.
- Results indicate that human consumption of sablefish that received taurine supplemented feeds would result in low to moderate exposure to taurine with minimal health risks.

Juvenile sablefish were fed a low taurine, basal feed with seven graded levels of supplemental taurine to determine nutrient requirements for growth and feed efficiency. The basal feed was plant based, formulated primarily with soy and corn proteins with a minimal (9%) amount of fishmeal. The unsupplemented, basal feed contained 0.14% residual taurine. Experimental feeds were supplemented with 0, 0.25, 0.50, 1.0, 1.5, 3.0, and 6.0 % taurine. Using the five parameter, saturated kinetic model (5 SKM), peak weight gain was predicted at 1.5% dietary taurine with optimum (95% of peak response) weight gain



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predicted between 0.4% and 5.8%. Peak feed efficiency was predicted at 1.1% dietary taurine with optimum weight gain predicted between 0.4% and 4.2%. Whole body and muscle tissue protein and lipid content were not affected by taurine supplementation. Tissue taurine content increased asymptotically with increasing dietary taurine supplementation. Whole body tissue became saturated at 0.25% taurine, expressed on a wet weight basis. Muscle tissue became saturated at 0.34% taurine. Results from this study should increase the performance of alternative, plant based feeds formulated for sablefish and enable regulatory agencies to better estimate the potential human exposure to taurine from the consumption of sablefish receiving these feeds.

Acceptance date: 03/27/2015

And on top of all that. . .Coping with ocean acidification in the midst of many stressors

Oceanography (2.986)

D. L. Breitburg, J. Salisbury, J. M. Bernhard, W. Cai, S. Dupont, S. C. Doney, K. J. Kroeker, L. A. Levin, **W. C. Long (NOAA Fisheries Alaska), L. M. Milke, S. H. Miller, B. Phelan (NOAA Fisheries NEFSC), U. Passow, B. A. Seibel, A. E. Todgham, A. M. Tarrant**

- The severity and effects of ocean acidification are modified by multiple other stressors such as, but not limited to, temperature, oxygen and food availability.
- It is necessary to incorporate consideration of multiple stressors in management, mitigation and adaptation to acidification, and to increase public and policy recognition of the importance of addressing acidification in the context of the suite of other stressors with which it potentially interacts.

Oceanic and coastal waters are acidifying due to processes dominated by increasing atmospheric CO₂ in the open ocean and nutrient-fueled respiration in estuaries and some coastal waters. The patterns and severity of acidification, as well as its effects, are modified by the host of stressors related to human activities that also influence these habitats. Temperature, de-oxygenation and changes in food webs are particularly important co-stressors because they are pervasive, and both their causes and effects are often mechanistically linked to acidification. Development of a theoretical underpinning to multiple stressor research that considers physiological, ecological and evolutionary perspectives



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is needed because testing all combinations of stressors and stressor intensities experimentally is impossible. Nevertheless, use of a wide variety of research approaches is a logical and promising strategy for improving understanding of acidification and its effects. Future research that focuses on spatial and temporal patterns of stressor interactions, and identifying mechanisms by which multiple stressors affect individuals, populations and ecosystems, is critical. It is also necessary to incorporate consideration of multiple stressors in management, mitigation and adaptation to acidification, and to increase public and policy recognition of the importance of addressing acidification in the context of the suite of other stressors with which it potentially interacts.

Acceptance date: 10 March 2015

Genetic population structure of Hogfish (Labridae: Lachnolaimus maximus) in the southeastern United States

Fishery Bulletin (1.783)

S. Seyoum, A. B. Collins, C. Puchulutegue, **R. S. McBride (NEFSC)**, and M. D. Tringali

- The genetics data agree with life history data that hogfish are spatially segregated into different stocks on each coast in the southeast United States (Atlantic Ocean vs. Gulf of Mexico)
- These data were incorporated into the recent stock assessment of hogfish (Southeast Data Assessment Review, <http://sedarweb.org/sedar-37>).

Hogfish (Labridae: *Lachnolaimus maximus*) is distributed across several biogeographic regions, but its stock structure has been poorly documented, confounding stock assessment and management of this reef fishery species. This study examined the genetic structure of Hogfish over a portion of its southeastern U.S. range using a suite of 24 microsatellite DNA loci. Fin clips from 719 specimens were obtained from geographic locations ranging from northwest Florida to North Carolina. Genomic proportions of Hogfish were partitioned into three distinct genetic clusters, geographically delineated as (1) the eastern Gulf of Mexico, (2) the Florida Keys and the southeast coast of Florida, and (3) the Carolinas. Clusters 1 and 2 converged along the coastal area west of the Florida Everglades, but the location of the genetic break between Clusters 2 and 3 requires further study due to a discontinuity in specimen collection



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between the Florida Keys/southeast Florida and the Carolinas. The presence of geographically limited reproductive exchange in this species suggests that future stock assessments should incorporate regionally partitioned analyses of life history and fishery data.

Acceptance date: March 12, 2015

Quantifying diadromous species in the diets of marine fishes in the Gulf of Maine

Journal of Fish Biology (1.734)

S. P. McDermott (GARO, Habitat Conservation Division, NMFS) N. C. Bransome, S. E. Sutton, **B. E. Smith, J. S. Link (Northeast Fisheries Science Center, NMFS)**, and T. J. Miller

- The first study to quantitatively assess the trophic significance of restoring sea-run migratory fish for commercially important finfish.

The objectives of this work were to quantify the spatial and temporal distribution of the occurrence of anadromous fishes (alewife *Alosa pseudoharengus*, blueback herring *A. aestivalis* and American shad *A. sapidissima*) in the stomachs of groundfishes in coastal waters of the Northwest Atlantic. Results show that diadromous fishes, particularly river herring, were detectable and quantifiable in the diets of several predators for every season sampled. Even though diadromous fishes were not the most abundant prey, they accounted for ~5 to 10% of the diet by weight for several predators. Statistical comparisons of these data with fish diet data from a broad-scale survey of the Northwest Atlantic indicate the frequency of this trophic interaction was significantly higher within targeted sampling areas of the present study than in the broad-scale survey. Odds ratios of diadromous predation were as much as 460 times higher in the targeted sampling as compared to the broad-scale sampling. Analyses indicate that diadromous prey consumption was more concentrated in the near-coastal waters compared to consumption of a similar but more widely distributed species, the Atlantic herring *Clupea harengus*. In the context of ecosystem-based fisheries management, our results suggest that even low-frequency feeding events may be locally important; exactly how important remains an intriguing question.

Acceptance date: March 11, 2015



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APRIL 13, 2015

*Records of two manefishes, *Platyberyx andriashevi* and *P. rhyton* (Teleostei: Perciformes: Caristiidae), from off the Ogasawara Islands, Japan*

Species Diversity (0.989)

M. Okamoto and **D. E. Stevenson (NMFS/AKFSC)**

- Extends the known range of *P. andriashevi* into Japanese waters
- Provides morphological data for the third known specimen of *P. rhyton*

We examined four specimens of caristiids from the Ogasawara Islands, southern Japan, and identified two species of the genus *Platyberyx*: *P. andriashevi* (Kukuev, Parin and Trunov, 2012) and *P. rhyton* Stevenson and Kenaley, 2013. The three specimens of *P. andriashevi* represent the first records of this species in Japan. We propose a new Japanese name for the species and present morphological data on these recently collected specimens. *Platyberyx rhyton* was previously known from only two specimens from off northeastern Japan. We provide morphological data for the third recorded specimen of this species, and present a key to the five species of Caristiidae currently known from Japan.

Acceptance date: March 2, 2015

Dynamic ocean management: 21st century approaches for marine resource management and conservation

Bioscience (5.439)

R. Lewison, A.J. Hobday, S. Maxwell, **E.L. Hazen**, J.R. Hartog, D.C. Dunn, D. Briscoe, S. Fossette, C. E. O’Keefe, M. Barnes-Mauthe, M. Abecassi, **S. J. Bograd (NMFS/SWFSC)**, N. D. Bethoney, H. Bailey, D. Wiley, S. Andrews, E. Howell, L.J. Hazen, L.B. Crowder

- A number examples exist of managing marine resources using a dynamic, spatially adapting management approach.
- Many fisheries examples have improved fisheries yield and reduced bycatch serving as a win-win.
- We need more dynamic management approaches to successfully manage highly mobile species in highly mobile environments.

The world’s oceans are under an unprecedented level of pressure from resource use and commercial activities—for example, fisheries, shipping, aquaculture, and mineral, natural gas, and oil extraction. The impacts from



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these activities are compounded by climate change, pollution, and invasive species (Halpern et al. 2008, Merrie et al. 2014). In the face of these chronic influences from human activities, ecosystem functions and the services they provide are being eroded (MEA 2005). Ocean management approaches that can address these growing pressures have been the focus of considerable research and agency action (Foley et al. 2010, Ban et al. 2014).

Expected publication date: Mar 15, 2015

Available online:

<http://bioscience.oxfordjournals.org/content/early/2015/03/10/biosci.biv018.short?rss=1>

NWS Publications

A validation of passive microwave rain rate retrievals from the Chinese Feng Yun (FY) 3B Satellite

Journal Hydrometeorology of AMS (2.95)

B. Xu (NWS/NCEP/CPC), P. Xie (NWS/NCEP/CPC), M. Xu, L. Jiang, C. Shi, and R. You

- Data from this satellite is a candidate for inclusion in NWS Climate Prediction Center precipitation monitoring products.

Rain rate retrievals from the Microwave Radiation Imager (MWRI) aboard the Chinese FengYun (FY) 3B satellite are verified using rainfall measurements from a weather station (AWS) network over the eastern China for the warm seasons (May – September) of 2012 and 2013. In general, the current version FY-3B detects raining pixels and quantifies rain-rate. However, the rain rate retrievals tend to miss rainfall from warm and low clouds of small scales, and under- (over)-estimate heavy (light) precipitation. Maximum rainfall detected by the FY-3B retrievals is shifted by about 7-8 km toward the leeward direction, most likely caused by the displacement between the heavy rainfall and tallest cloud top. Data from this satellite is a candidate for inclusion in NWS Climate Prediction Center precipitation monitoring products.

Accepted: 23 February 2015

How much evidence is required for acceptance of productivity regime shifts in fish stock assessments: are we letting managers off the hook?

Fisheries Research (1.843)



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N. Klaer, R. N. O'Boyle, **J. J. Deroba**, S. E. Wayte, R. Little, **L. A. Alade**, **P. J. Rago (NMFS/NEFSC)**

- Conclusions about productivity shifts, are often based on unstructured and ad hoc debate.
- The authors provide a structure for debate about productivity shifts and a ranking scheme to measure strength of evidence.

A difficult question often confronting fisheries assessment scientists and managers is whether or not to accept that a shift in stock productivity has occurred. This is particularly the case when a stock has remained at historically low biomass despite management intervention and when there is an expectation that there should have been a stock recovery. We outline a weight-of-evidence approach that provides a structured means to evaluate this question. The approach, which scores a range of attributes, was applied to five fisheries from the NW Atlantic and SE Australia, chosen to provide a range of supporting evidence, as well as different potential causal mechanisms for the productivity shift. Given the resulting scores for the example stocks, and whether a productivity shift has been accepted for those stocks, a score of between 7 and 12 indicated a level required for acceptance of productivity shift. The approach has highlighted areas of future research that would improve individual species scores. It is hoped that the paper will encourage a more systematic examination of potential stock productivity shifts in assessments than has hereto been the case.

Accepted: 26 March 2015

The fishery performance indicators: a management tool for the triple bottom line

PLoS ONE (3.53)

J. L. Anderson, C. M. Anderson, J. Chu, J. Meredith, F. Asche, G. Sylvia, M. D. Smith, D. Anggraeni, R. Arthur, **D. S. Holland**, A. Guttormsen, M. Schmid, W. Akpalu, F. Alfredsson, H. Eggert, J. Flores, M. Freeman, G. Knapp, M. Kobayashi, S. Larkin, K. MacLauchlin, K. Schnier, M. Soboil, S. Tveteras, H. Uchida, D. Valderrama, T. Ward (**NMFS/NWFSC**)

- Introduces the Fishery Performance Indicators (FPIs), a broadly applicable and flexible tool for assessing performance in individual fisheries that use the triple bottom line approach.



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- Demonstrates the importance of tracking economic and community outcomes as well as resource status by using 59 case studies of fisheries in industrial and developing countries.

Pursuit of the triple bottom line of economic, community and ecological sustainability has increased the complexity of management measures; so too must increase the complexity of the assessment of those management policies, and the research that guides science-based policy refinement. We introduce the Fishery Performance Indicators (FPIs), a broadly applicable and flexible tool for assessing performance in individual fisheries, and establishing cross-sectional links between enabling conditions, management strategies and triple bottom line outcomes. Conceptually separating measures of outcome performance, the FPIs use 68 individual outcome metrics—coded on a 1 to 5 scale based on expert assessment to facilitate application to data poor fisheries and sectors—that can be partitioned into sector-based or triple-bottom-line sustainability-based interpretative indicators. Variation among outcomes is explained with 54 similarly structured metrics of inputs, management approaches and enabling conditions. Using 59 initial fishery case studies drawn from industrial and developing countries around the world, we demonstrate the inferential importance of tracking economic and community outcomes, in addition to resource status.

Accepted: March 24 2015

*First eastern North Pacific record of the velvet dogfish, *Zameus squamulosus* (Chondrichthyes: Squaliformes: Somniosidae)*

Marine Biodiversity Records (NA)

D. A. Ebert, J. D. S. Knuckey, **D. J. Kamikawa (NMFS/NWFSC)**

- In this paper, the first record of the velvet dogfish, caught from the eastern North Pacific is reported.

The velvet dogfish, *Zameus squamulosus*, is a poorly known deep water shark, known from the Atlantic, Indian, western central and south-eastern Pacific Oceans. The shark, a male 533 mm in total length, was caught by bottom trawl at a depth of 770.7 m off Long Beach, California.

Accepted: April 2015

Habitat use by juvenile salmon sharks links upwelling to strandings in the California Current



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Marine Ecology Progress Series (2.64)

A. B. Carlisle, S. Y. Litvin, **E. L. Hazen** (NMFS/SWFSC), D. J. Madigan, K. J. Goldman, R. N. Lea, B. A. Block

- While juvenile salmon sharks rely on the California Current to forage, cold upwelled waters can act as a stressor and lead to increased rate of stranding.
- This study suggests that juveniles are thermally limited and stressed by upwelling events, resulting in the bacterial infections that are the proximate cause of the strandings.
- Stable isotopes support this inshore migration for stranded salmon sharks illustrating the movement from offshore pupping areas to the California Current Ecosystem.

The use of nursery areas by elasmobranchs is an important life history strategy that is thought to reduce juvenile mortality and increase population growth rates. The endothermic salmon shark *Lamna ditropis* uses the California Current System (CCS) as a nursery area, though little is known about how juveniles use this ecosystem. While strandings occurred along the entire west coast of North America throughout the year, strandings in the northern CCS were limited to summer and autumn, when mean sea surface temperatures were warmest. Strandings primarily occurred when water temperature was between 12 and 16°C, suggesting that juveniles occupy a relatively narrow thermal niche. Stable isotope analysis (SIA) indicated that juveniles primarily feed on offshore meso- and epipelagic prey from the outer shelf, slope, and oceanic habitats as opposed to inner shelf and coastal habitats, although sharks appeared to move inshore to more neritic habitats shortly before stranding. General additive models indicate that the probability of stranding was greatest when mean water temperatures were relatively high (~14°C) and sharks were exposed to acute cold-water events (~9°C) during coastal upwelling. This suggests that juveniles are thermally limited and stressed by upwelling events, resulting in the bacterial infections that are the proximate cause of the strandings.

Expected publication date: April 30 2015

NOS Publications

Longitudinal measures of perfluoroalkyl substances (PFAS) in serum of Gullah African Americans in South Carolina: 2003-2013



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Environmental Research (3.951)

M. O. Gribble, S. M. Bartell, K. Kannan, Q. Wu, **P. A. Fair**, D. L. Kamen
(NOS/NCCOS)

- One main route of exposure to PFAS is through consumption of contaminated foods including fish, and as local seafood is a dietary staple in the Gullah African American population, this population may be at risk for higher exposure to PFAS.
- Serum concentrations of PFOS and several other PFAS decreased over 2003-2013 among Gullah African Americans in coastal South Carolina.
- Age may be an important modifier of PFAS exposure trajectories; future studies should investigate possible mechanism by which age may modify these trajectories.

Charleston Harbor has elevated concentrations of PFAS in dolphins, but local human exposure data are limited. We sought to describe PFAS serum concentrations' temporal trends among Gullah African American residents of coastal South Carolina. Population concentrations of PFOS dropped approximately 9 (95% CI: 8, 10) percent each year over 2003-2013. This was concordant with individual PFOS trajectories (median PFOS change score -21.7 ng/g wet weight, interquartile range of PFOS change scores: -32.8, -14.9) and reports for other populations over this time period. Several other compounds also showed a population-level decrease. However, examination of individual trajectories suggested substantial heterogeneity. Post-hoc analyses indicated that PFAS trajectories were heterogeneous by age. Many PFAS compounds are decreasing in a sample of Gullah African Americans from coastal South Carolina. There may be age differences in the elimination kinetics of PFASs. The possible role of age as a modifier of PFAS serum trends merits further research.

Accepted: 16 March 2015

*Elevated Levels of Perfluoroalkyl Substances in Estuarine Sediments of
Charleston, SC*

Science of the Total Environment (3.163)

N. D. White, **L. Balthis**, K. Kannan, A. O. De Silva, Q. Wu, K. M. French, **J. Daugomah**, C. Spencer, and **P. A. Fair** (NOS/NCCOS)



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- The present study provides a comprehensive overview of the organic fluorine contamination in sediments from the Charleston estuarine system.
- Perfluoroalkyl sediment levels in Charleston SC are higher than any other urban U.S. area, with 52% of the sites exceeding median global PFOS sediment concentration.
- Occurrence and distribution of detected PFAS with multiple hot spots indicate continuing inputs.

Urban areas are sources of perfluoroalkyl substances (PFASs) in the environment, although little is known about specific point sources and distribution of PFASs. Sentinel species, like bottlenose dolphins, are important indicators of environmental perturbations. The high PFAS levels found in dolphins inhabiting Charleston, South Carolina prompted investigation of these chemicals in this area. This study provides further evidence on the extent of contamination, the potential sources and fate of PFASs. In this study, concentrations of 11 PFASs measured in estuarine sediments collected in 2012 from the Charleston Harbor and the Ashley and Cooper Rivers (n=36) in South Carolina revealed higher levels than those reported in any other U.S. urban areas. Detectable levels were found in all sample locations with mean total PFAS concentrations of 3.79 ng g⁻¹ (range 0.22 to 19.2 ng g⁻¹ d.w.).

Dominant compounds were perfluorooctane sulfonate (PFOS) (mean 1.52 ng g⁻¹; range 0.09-7.37 ng g⁻¹ d.w.), followed by perfluorodecanoate (PFDA) (mean 0.83 ng g⁻¹; range 0.06-4.76 ng g⁻¹ d.w.) and perfluorooctanoate (PFOA) (mean 0.42 ng g⁻¹; range 0.02-2.52 ng g⁻¹ d.w.). PFOS levels in sediments at 19 of 36 sites (representing 52% of the study area) exceeded the published global median PFOS sediment concentration of 0.54 ng g⁻¹.

Accepted: March 2015

NESDIS Publications

OAR Publications

Inline coupling of WRF-HYSPLIT: model development and evaluation using tracer experiments

Journal of Applied Meteorology and Climatology (2.099)

F. Ngan, A. Stein, and R. Draxler (OAR/ARL)

HYSPLIT, a Lagrangian dispersion model, has been coupled (inline) to the WRF-ARW meteorological model in such a way that the HYSPLIT calculation is run as part of the WRF-ARW prediction calculation. This inline version of



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HYSPLIT takes advantage of the higher temporal frequency of WRF-ARW variables compared to what would be available for the offline approach. Furthermore, the dispersion calculation uses the same vertical coordinate system as WRF-ARW, resulting in a more consistent depiction of the state of the atmosphere and the dispersion simulation. Both inline and the offline HYSPLIT simulations were conducted for two tracer experiments in quite different model spatial resolutions: the CAPTEX in regional scale (at 9-km grid spacing) and the ASCOT in fine scale (at 333.3-m grid spacing). Comparing the model to the measured values, the results between the two approaches were very similar for all six releases in CAPTEX. For the ASCOT experiments, the cumulative statistical score of the inline simulations was better than or equal to offline runs in four out of five releases. While the use of the inline approach did not provide any advantage over the offline method for the regional spatial scale and medium range temporal scale represented by the CAPTEX experiment, the inline HYSPLIT was able to improve the simulation of the dispersion compared with the offline version for the fine spatial and temporal resolution over complex terrain area represented by ASCOT. The improvement of the inline over the offline calculation is attributed to the elimination of temporal and vertical interpolation of the meteorological data compared to the offline version.

Expected Publication Date: June 2015

OTHER REPORTS, BOOK CHAPTERS, AND INTERNAL PUBLICATIONS

NMFS Publications

Wildlife forensics: an overview and update for the prosecutor

United States Attorneys Bulletin

M. K. Burnham-Curtis (USFWS), P. W. Trail (USFWS), R. Kagan (USFWS),
M. K. Moore (NMFS/NWFSC)

- Review paper to help attorneys successfully prosecute wildlife cases
Proving criminal violations that involve the poaching, smuggling, or illegal commercialization of wildlife often requires scientific testing and testimony regarding the species, cause of death, or correlation between tissue and the seized item. Such testing and testimony is usually conducted by scientists and laboratories that specialize in this area of forensic analysis. As in human-victim cases, wildlife forensic analysis may involve genetics, morphology, chemistry, and pathology. The requirements of Federal Rule of Criminal Procedure 16 and



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Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993), are equally applicable in trials of wildlife crime. However, the prosecutor wishing to maximize the chances for a successful outcome must be aware of the factors affecting the types of analyses that can be conducted in wildlife cases so that relevant, effective testing is performed and admissible, unbiased expert testimony results.

Accepted: 15 March 2015

Book Review of, "A Guide to the Rockfishes, Thornyheads, and Scorpionfishes of the Northeast Pacific"

Transactions of the American Fisheries Society

J. W. Orr (NMFS/AKFSC)

- This is a review of book providing first color guide to all the scorpaeniform fishes of the eastern North Pacific Ocean.

Accepted: February 2015